

CLAIMS

1. An object detecting device for preventing a seizure of an object between an opening and an opening-closing unit for opening and closing said opening, said object detecting device comprising:

5 a pressure-sensitive sensor disposed at one of said opening and said opening-closing unit, said pressure-sensitive sensor comprising:

pressure-sensitive means for generating an output signal depending on deformation; and

support means for supporting said
10 pressure-sensitive means at said one of said opening and said opening-closing unit, said support means including a vibration damping portion for damping vibration propagated to said pressure-sensitive means; and

judging means for judging the contact of the object with said
15 pressure-sensitive sensor on the basis of an output signal of said pressure-sensitive sensor.

2. The pressure-sensitive sensor of claim 1, wherein said vibration damping portion has a hollow portion provided therein.

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3. The pressure-sensitive sensor of claim 1, wherein said support means further includes a deformation amplifying portion for amplifying the deformation of said pressure-sensitive means, wherein said vibration damping portion functions also as said deformation amplifying portion.

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4. The object detecting device of claim 1,
wherein said judging means includes:

a filter for extracting only a specified frequency component from the output signal of said pressure-sensitive sensor.

5 5. The object detecting device of claim 1, wherein said judging means calculates an integral value of the output signal of said pressure-sensitive means per unit time, and judges the contact of the object with said pressure-sensitive sensor on the basis of the integral value.

10 6. The object detecting device of claim 1, wherein said judging means includes an abnormality judging unit for judging abnormality of said pressure-sensitive means on the basis of the output signal of said pressure-sensitive means corresponding to vibration of said opening or said opening-closing unit.

15 7. An object detecting device for preventing a seizure of an object between an opening and an opening-closing unit for opening and closing said opening, an end of said opening-closing unit being arranged to contact an edge of said opening, said object detecting device comprising:

20 a pressure-sensitive sensor disposed at one of said opening and said opening-closing unit, said pressure-sensitive sensor comprising:

 pressure-sensitive means for generating an output signal depending on deformation; and

 support means for supporting said
25 pressure-sensitive means at said one of said opening and said opening-closing unit, said support means being capable of being bent along a shape of one of said end of said opening-closing unit and said edge

of said opening; and

judging means for judging the contact of the object with said pressure-sensitive sensor on the basis of an output signal of said pressure-sensitive sensor.

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8. The object detecting device of claim 7, wherein said one of said opening and said opening-closing unit includes a bent part, and said support means supports said pressure-sensitive means at said bent part.

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9. The object detecting device of claim 7, wherein said pressure-sensitive means has a co-axial structure including:

a central electrode;

a piezoelectric layer around said central electrode; and

an outside electrode around said piezoelectric layer.

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10. The object detecting device of claim 9, wherein said piezoelectric layer comprises composite piezoelectric material including amorphous chlorinated polyethylene, crystalline chlorinated polyethylene, and piezoelectric ceramic powder.

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11. The object detecting device of claim 9, wherein said outside electrode includes:

a polyethylene terephthalate layer; and

an aluminum film on said polyethylene terephthalate layer.

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12. The object detecting device of claim 9, wherein said central electrode includes:

an insulating polymer fiber; and
a metal coil wound around said insulating polymer fiber.

13. The object detecting device of claim 7, wherein said support
5 means comprises elastic material more flexible than said pressure
sensitive means.

14. The object detecting device of claim 7, wherein said support
means has a hollow portion provided therein.

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15. The object detecting device of claim 7, wherein said
pressure-sensitive means is incorporated in said support means.

16. An object detecting device for preventing a seizure of an object
15 between an opening of a body and a slide door for opening and closing
said opening, said slide door having an end in a closing direction, said
object detecting device comprising:

a pressure-sensitive sensor comprising:

pressure-sensitive means for generating an output
20 signal depending on deformation; and

support means for supporting said
pressure-sensitive means at one of said opening and said slide door; and

judging means for judging the contact of the object with said
pressure-sensitive sensor on the basis of an output signal of said
25 pressure-sensitive sensor,

wherein said body, said opening, and said slide door have
undulated portions,

wherein said one of said opening and said slide door has an end having a bent part corresponding to said undulated portions, and

wherein said support means supports said pressure-sensitive means at said bent part as to allow said support means to be bent.

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17. The object detecting device of claim 16, wherein said pressure-sensitive means has a co-axial structure including:

a central electrode;

a piezoelectric layer around said central electrode; and

10 an outside electrode around said piezoelectric layer.

18. The object detecting device of claim 17, wherein said piezoelectric layer comprises composite piezoelectric material including amorphous chlorinated polyethylene, crystalline chlorinated polyethylene,
15 and piezoelectric ceramic powder.

19. The object detecting device of claim 17, wherein said outside electrode includes:

a polyethylene terephthalate layer; and

20 an aluminum film on said polyethylene terephthalate layer.

20. The object detecting device of claim 17, wherein said central electrode includes:

an insulating polymer fiber; and

25 a metal coil wound around said insulating polymer fiber.

21. The object detecting device of claim 16, wherein said support

means comprises elastic material more flexible than said pressure sensitive means.

22. The object detecting device of claim 16, wherein said support
5 means has a hollow portion provided therein.

23. The object detecting device of claim 16, wherein said pressure-sensitive means is incorporated in said support means.